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Chief financial officer roles and enterprise risk management: An empirical based study

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ABSTRACT

This study investigates the influence of CFO roles on the implementation of ERM initiatives in a sample of Nigerian financial institutions (between 2013-2017). We develop three distinct factors representing the CFO roles namely CFO power, CFO experience and CFO knowledge using principal component factoring. Like prior work, we measure ERM components simultaneously to capture the extent of sophisticated ERM system. Our findings pose that the CFO involvement in ERM implementation remains minimal while the CRO is solely responsible for ERM implementation, which could undermine cost-benefit effectiveness. Our empirical evidence reports that the sophisticated ERM only promote the market evaluation while the accounting performance is undermined. The result then contravenes the expectation that effective ERM enhances accounting performance by mitigating risk exposure. While the sophisticated ERM is significantly positive with leverage, which reveals that ERM implementation does not necessarily reduce the firm risk. This indicates that the ERM implementation remains ineffective to mitigate risks, where the CFO involvement in the ERM initiative is limited. We then advocate that CFOs should be allowed to contribute strongly on some specific aspects of ERM initiatives namely identification and analysis of key risk indicators, the financial implication of risks and integration of ERM into traditional finance activities.

1. Introduction

With the complexity of the business environment, management seeks to mitigate risks and the ability of firms to identify those risks early has formed part of the critical success factor (Soltanizadeh et al., 2014). This discretion in identifying and managing risk has resulted in the application of different approaches in mitigating such risks. Different interpretations and approaches to mitigating risks have undermined the effective managing risks, which are basically based on prior knowledge, organizational roles and industry (IFAC, 2018; Ojeka et al., 2017a). For instance, the measurement and assessment of risk have been a predominantly quantitative exercise designed to avoid loss or fraud in financial institutions. Since the financial crisis, the adopted approach is tailored to adequately inform decisions and manage uncertainty. Risk management is viewed as activities to prevent rather than processes to retorting crisis. However, the arising challenge with applying this pattern of risk management, which relies solely on mitigating risks increases cost while the resultant benefits to the firm's success and resilience remains minimal (IFAC, 2018).

Enterprise Risk Management (henceforth ERM) is gaining ground among the practitioners and firms adopt it to identify and mitigate risk holistically. ERM approaches risk beyond silo-based view (Gordon et al., 2009). ERM requires the integration of different aspects of an organization and multiple procedures to collectively comprehend the level of an organization's exposure to uncertainties, which could distort the business objectives and the prospects for growth. ERM analyzes available information, which identifies the success or failures of uncertainties while decisions are based on the potential courses of action. The key goal of risk management is to increase shareholders' value (COSO, 2004; Pagach and Warr, 2011; Liebenberg and Hoyt, 2003). Beyond effective management decisions, ERM could foster more efficient capital allocation (Myers and Read, 2001), strong capital structure decision (Graham and Rogers, 2002), well-informed risk management decisions (Cummins, et al., 2001) and create risk responsiveness, which advances operational and strategic

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decision (Grace et al., 2014).

Prior corporate failures have necessitated the need for effective risk management strategies. These corporate failures could be traced to ineffective risk management and corporate governance while corporate governance and risk management are intertwined (Quon et al., 2012; Sprčić et al., 2015). Similarly, the stability of a company's performance is highly dependent on the effective role of the board (Bromiley et al., 2015). Risk management practice has recently extended beyond risk transfer through insurance and hedging of financial exposure or volatility. Some companies now appoint Chief Risk Officer who is saddled with risk management responsibility, who either reports to the Chief Financial Officer, Chief Executive Officer or directly to the board (Sprčić et al., 2015). The development of ERM and its impact influence on business performance propose that the business growth cannot rely solely on traditional business strategies (Nor et al., 2016). The board also comprehends how uncertainties could influence the business strategy.

A strand of literature has emerged examining the effectiveness of ERM adoption. A handful of studies investigates the value of ERM proxies to the appointment of CROs (Beasley, Pagach & Warr, 2008; Pagach and Warr, 2011). Some works of literature consider the determinants of firm management risk management endeavours and reveal an increase in adoption of ERM and the appointment of CROs in different industries. Colquitt et al. (1999) opine that ERM is common in financial institutions. A study by Liebenberg and Hoyt (2003) avers highly leveraged firms possibly appoint Chief Risk Officers (CROs) as a signal for effective risk management efforts. In addition, Pagach and Warr (2011) opine that organizations with high leverage, aggressive earning volatility, low stock performance and linear relationship with CEOs' compensation and stock volatility tend toward having a CRO. However, the study of Beasley et al. (2005) examines the relationship between ERM and performance, which poses that market reaction to appointing CRO is insignificant for some firms while is significant for some set of firms. In contrast, Hoyt and Liebenberg (2011) elucidate that there is a positive relationship between the firm value and the appointment of CRO. Studies tend to focus more on the CRO as evident for effective risk management in a firm.

The key question in corporate governance that remains unanswered is that; does Chief Financial Officer (henceforth CFO) role matter in enterprise risk management initiatives? Beyond the periodic disclosure of the financial report, most companies consider CFOs next to the Chief Executive Officer in any public interaction (Caglio et al., 2018). Currently, the clamour for the active involvement of CFOs in major business decisions beyond financial performance disclosure and other functional roles is increasingly amplified. CFOs now actively involved in the formulating and executing the organizational strategy (Datta and Datta, 2014). CFOs are companies' financial stewards who are basically charged to prepare financial reports and involve in strategy planning and assist in the company policies formulations (Duong and Evans, 2015). As a member of the senior executive team, they sometimes sit on the board and contribute to decisions making.

The demand for CFO in strategy, performance and risk management is increasingly gaining attention from the practitioners. Based on the report by International Federation of Accountants (2018), CFO roles encompasses risk management approaches ranging from project appraisals proposal concerning both financial and non-financial implications; make forecasts based on key performance indicators of value and cost; identifying risks and risk analysis through sensitivity analysis and scenario modelling. In essence, the CFO is not expected to solely mitigate risks but through value creation and preservation promotes effective risk management. In addition to mitigating and controlling risk, the CFO can facilitate “intelligent risk-taking” endeavours (IFAC, 2018). The CFO tends to provide needful information based on the drawn data and activities of the organization and act as "spider in the web". Globally, the complexity of business environment requires the role of CFO especially in risk management to foster, which is not based only on specific risk such as financial risk but encompasses other risks. Furthermore, Cohen, Krishnamoorthy and Wright (2014a) suggest that CFO plays a large role with ERM.

However, there are little empirical studies validating the role of CFOs on risk management (KPMG, 2013; Clyburn, 2012), which this study tends to explore. We focus on the moderating effect of CFO roles on enterprise risk management practices and firm performance. To identify the role of CFO, we construct a CFO index following the prior study (Caglio et al., 2018). Caglio et al. (2018) only examine the relationship between the CFOs roles and CFOs compensation while we explore the effect of CFOs role on enterprise risk management. We then further develop three distinct factors representing the CFO roles namely; CFO power, CFO experience and CFO knowledge using principal component factoring. The essence of the index tends to eliminate any effect of multicollinearity (Tarchouna et al., 2017). In addition, we investigate the extent of ERM implementations on the firm performance while moderating the effect of CFO roles. Based on the extracted data from thirty-three (33) financial institutions in Nigeria with timeframe 2013–2014. We find that the CFO involvement in ERM implementation remains minimal while the CRO is solely responsible for ERM implementation, which could undermine cost-benefit effectiveness. Moreover, the study further examines the influence of sophisticated ERM on firm performance while moderating the effect of CFO. We find that ERM focuses basically on market evaluation while minimizing accounting-based performance significantly. We then advocate that CFOs should be allowed to contribute strongly on some specific aspects of ERM initiatives namely identification and analysis of key risk indicators, the financial implication of risks and integration of ERM into traditional finance activities.

This study contributes to the emerging studies on ERM implementation by exploring the influence of CFOs on risk management. This paper is unique as we consider the importance of CRO on risk management strategies. This study first extends the prior studies by examining the influence of diverse CFO characteristics on ERM thereby contributing to the limited literature on the subject-matter in Nigeria context. In addition, this study tends to help the practitioners to reprioritize the necessity for engaging the CFO on risk management endeavours. In furtherance of achieving global relevance in emerging countries, this study will help the policymakers in emphasizing on the role of CFOs in risk strategy decisions.

The remainder of this paper is patterned as follows: Section 2 deals with the literature reviews, why the focus on financial institutions and the roles of CFO in ERM initiatives. Section 3 undertakes the research design and methodology. Section 4 presents descriptive statistics and empirical analysis results. Section 5 reports the additional analysis undertaken with the robustness analysis. Section 6 makes the final conclusions and suggestions.

2. Literature review

This study emphasizes on the financial institutions because agency theory asserts that the executives could have minimal risk appetite compared to shareholders as their short-term benefits of control and undiversifiable human capital investments of the firm are at stake (Faleye and Krishnan, 2010). Interestingly in the case of bank bankruptcy, managers also have the tendency to lose invested wealth in the firm (Devriese et al., 2004). Generally, financial institutions are more leveraged compared to non-financial institutions in which the level of board risk appetite to maximize shareholders wealth could increase the chance of fiasco. However, financial institutions are exposed to various financial risks such as credit, interest rate and counterparty risks, which reflects their exclusive position as financial intermediaries. Thus, the excessive risk appetite of banks could have significant negative externalities on the macroeconomic and systemic risk, which encourage a highly regulated environment for financial institutions (Haan and Vlahu, 2012). Recently, corporate collapses have contributed significantly to the financial market insecurity globally, which has triggered diverse regulatory responses (Salim et al., 2016).

2.1. Theoretical underpinning

There are diverse enterprise risk management frameworks. However, the most popular and generally accepted ones are AS/NZS 4360 put forward by Australian and New Zealand's Risk management standards and COSO (2004) formulated by the committee of Sponsoring Organizations of the Treadway Commissions (Soltanizadeh et al., 2014). According to the Committee of Sponsoring Organization of the Treadway Commission (henceforth COSO), the enterprise risk management as:

> "a process, effected by an entity's board of directors, management and other personnel, applied in strategy setting and across the enterprise, designed to identify potential events that may affect the entity, and manage risk to be within its risk appetite, to provide reasonable assurance regarding the achievement of entity objectives" (COSO, 2004).

Saeidi et al. (2019) recognize eight risk management elements, which include internal environment as it factors in the internal policies philosophies and values of the firm, setting of objectives, identification of possible losses and opportunities that might hinder the firm from achieving set goals, assessing of impact of risks on the firms performance, determination of the appropriate way of dealing with risk and losses, control activities, communication of information across the firm to enable achievement of goals, monitoring and evaluation of enterprise risk management. They concluded that enterprise risk management as given by COSO (2004) would help a firm achieve both short and long term goals, the accuracy of reporting as well as a high level of compliance with regulations. Tekathen and Dechow (2013) opined that COSO (2004) has dimensional model which states that the top-down approach to risk management by stating that hierarchal positions should be used to define managerial responsibilities, adherence to firms policies and laws by managers and personnel alike should be measured using code of compliance, audibility is of great advantage to the firm. Standards Australia/Standards New Zealand AS/NZS 4360 (2004) has cited by Bromiley et al. (2015) explains enterprise risk management as all activities embarked by a firm to ensure the proper management of opportunities and the effective management of the adverse effects that arise from the said opportunities. The two frameworks are different in terms of understanding and definition of enterprise risk management are considered has identified by prior studies (Brown et al., 2009; Hill, 2008). Enterprise risk management as defined by (Hill, 2008), bringing both COSO (2004) and Standards Australia/Standards New Zealand AS/NZS 4360 (2004) together as

> "the principles of define, identify, analyze, treat, report and monitor risks are fundamentally the same even though the number of steps and terminology may change."

Prior studies have basically focused on the implementation of enterprise resource planning, the concept which is no longer so new is expected to have grown beyond the implementation stage. In addition, after the implementation stage, a large number of studies indicate that firms employ the services of a Chief Risk Officer whose main job is enabling the efficient and effective governance of risk in enterprise risk management without factoring in the significance and advantages the presence of a chief financial officer whose duty involves tracking cash flow, financial planning as well as determining the firm's financial strength and weaknesses and proposing corrective action brings to enterprise risk management. However, the question of to what extent does the involvement of a Chief Financial Officer affect enterprise risk management remains unanswered.

2.2. Enterprise risk management

The risk was managed separately and handled by different departments until the risk management revolution of the 70s, headed by Kloman (2010) when he suggests that risk should be managed holistically, which is reiterated by researchers and practitioners alike. Crockford (1980) opines that the process and strategy used for risk management should cut across industries and not just restricted to departments or specific companies. Bannister and Bawcutt (1981) further aver future uncertainty is better managed and curbed if industries and professions commonly develop a specific framework. Haimes (1992) posits that before resource allocation is done, risk management decisions must be considered. The first official definition of enterprise risk management provided by Dickinson (2001) ascertains the concepts of risk management in the mid-90s. However, the first wildly accepted definition was provided by Dárcy and Brogan (2001), which involves the increase in entity's value both short and long term through the effective assess, proper control, intense exploitation, efficient financing and adequate monitoring of risks across all industries. The committee of Sponsoring Organizations of the Treadway Commissions (COSO, 2004) identify risk management as the process which affects the management, personnel and board of directors of an entity and it is basically designed to identify, tackle and manage situations that might have a negative effect on the entity and its risk appetite. This is applicable to every department and section of the entity and includes the strategy-setting process to enable the ultimate achievement of the set goals and objectives.

Studies have considered the effect of enterprise risk management on various factors. Renault et al. (2016) posit that enterprise risk management implementation reduces cost and curbs earnings volatility, which eventually increase competitive advantage. Tekathen and Dechow (2013) conclude that enterprise risk management is not the ultimate solution to curbing risks but it simply provides an avenue by which risk could be managed appropriately. Ahmad et al. (2014) using survey questionnaires identify that companies' risk management strategy have proactive benefit by the reduction of losses and cost. They also note that a large number of firms hire Chief Risk Officers and could help the enterprise resource management decisions before asset allocation. Quon, Zeghal and Maingot (2012) using survey questionnaires identify that adoption and implementation of enterprise risk management help companies better prepare and hedge for risk. Florio and Leoni (2017) suggest that the implementation of enterprise risk management influences firm performance positively as well as market evaluation. Kashif, Lai and Lai (2019) find that the implementation of enterprise risk management promotes a firms value as well as its competitiveness. Fraser and Simkins (2016) opine that enterprise risk management helps the functionality of a firm positively. Saeidi et al. (2019) recognize that the implementation of enterprise risk management helps improve the firm's competitive advantage. Kleffner, LEE, & McGannon (2003) identify that after the implementation of enterprise risk management, the Chief Risk Manager has a big role to play in its success.

2.3. Roles of chief financial officer

The success of the adoption and implementation of enterprise risk management goes beyond the Chief Executive Officers commitment but as well as every member of the management team. To achieve the strategic objectives of the firm, the significant contribution of the Chief Financial officer especially on risk management is needful (IFAC, 2018). The chief finance officer is simply as an individual in charge of monitory of cash flow, financial planning and preparation of the financial report. In addition, the CRO role has encompassed the determination of the firm's financial capacity and provision of corrective action to effectively and efficiently navigate firm's risk (Hoitash et al., 2016). Datta and Datta (2014) suggest that CFO has more to offer in the adoption of enterprise risk management as the CEO and could provide expert knowledge on risk and financial opportunities available to the firm, cash control, capital budgeting, external financing as well as capital investment.

Each firm has respective specific finance modules and it is based on these modules that enterprise risk management is adopted. With the

Chief Financial officer being in charge of the modules, he has a significant role to play in the adoption of enterprise risk management (Caglio et al., 2018). The adoption of enterprise risk management requires resources such as capital, operation cost as well as intensive analysis of the probability of adoption being successful. The allocation of such resources would require the expert opinion of the CFO before strategic decisions are made. In addition, the CFO has a bigger role to play in enterprise risk management adoption in firms where there exist no Chief Information Officer. CFO tends to take the responsibilities of the Chief Information Officer, by giving adequate information beyond finance and Account but encompassing IT decisions that are strategic in nature, which involve the responsibility of enterprise risk management implementation (Hiebl et al., 2017).

We postulate the following hypotheses;

H1. There is a positive relationship between CFO power and Enterprise Risk Management.

H2. There is a positive relationship between CFO Experience and Enterprise Risk Management.

H3. There is a positive relationship between CFO Knowledge and Enterprise Risk Management.

3. Methodology

3.1. Sample

We test our postulated hypotheses on the financial service companies listed on the Nigerian Stock Market. We draw thirty-three (33) companies from the fifty-seven (57) financial institutions after filtering criteria are adopted. We drop firms with insufficient variables desired for this study. In addition, firms with at least five (5) consecutive data are selected, which allow for the robustness of results (Petersen, 2009). The desired variables are hand-collected from the annual reports and the corporate governance section of the firms' websites. We consider five (5) years from 2013-2107 because the firms have fully implemented and disclosed all reports on Enterprise Risk Management following the Central Bank of Nigeria directives.

3.2. Measures

As mentioned earlier, this study emphasizes the CFO characteristics as the primary explanatory variable of ERM. This paper absorbs a quantitative content analysis of the annual reports to obtain information about companies' enterprise risk management practices and CFO characteristics. Following prior studies (Datta and Datta, 2014; Bédard et al., 2014; Caglio et al., 2018) and utilizing publicly available data, we hand-collect data relating to the CFO characteristics, which include CFO educational background (has MBA or equivalent), the CFO professional experience (i.e. has experience in auditing or consulting) with possession of any accounting professional certification (ACA, ACCA or CPA). These data tend to reveal the CFO with or without managerial competence (Datta and Datta, 2014) and with or without accounting background (Bédard et al., 2014). We also examine the level of CFO directorship that is if the CFO is on the board or not. To expand the prior studies on CFO characteristics solely based on managerial competence, we further follow the echelon theory, which theorizes the demographic characteristic that is CFO gender and CFO education.

A study by Bédard et al. (2014) poses that CFO on the board potentially exerts greater influence on management decisions. In aggregate, we have seven variables proxy for CFO characteristics; where four variables represent the CFO competence and experience that is professional certification, education, audit experience and consultancy experience. Also, one variable related to the CFO gender, another variable on CFO directorship and CFO retention.

The reliable measure for ERM has been quite challenging, which indicates the encompassing sophistication involved. To this end, prior studies (Beasley et al., 2005; Hoyt and Liebenberg, 2011; Liebenberg and Hoyt, 2003; Pagach and Warr, 2011) has adopted the appointment of CRO to signify the effective implementation of ERM or Risk Committee or relying on the content analysis in the annual reports of companies (Bertinetti et al., 2013; Gordon et al., 2009). Following the study of Florio and Leoni (2016), we adopt their ERM measure, which uses a two-step approach. This approach is consistent with a proper integrated ERM. The first approach sums all the identified indicators of ERM components, which include; if the annual report contains the risk management (*RiskReport)*, the existence of CRO in the firms *(CROx)*, possibility of the company designating specific risk management activities to risk committee (*RCommittee),* the interference of the board in the firm's risk management activities *(RBoard)*, the timeliness of the risk assessment procedures (*Rfrequency),* inclusive risk assessment procedure *(Rlevel),* and if the firm adopts both qualitative and quantitative methods (*Rmethod)*. The ERM score (*ERMsco*) ranges from 0 to 6, then we adopt a binary variable for *ERMsopH*, which equals 1 if *ERMsco* is higher than 3 and 0 otherwise.

We further apply control variables, which comprise the firm's characteristic that is the firm size (*Size)*. The firm size could affect the risk appetite and the resource available for ERM implementation (Baxter et al., 2013). In addition, we control for the firm leverage (*leverage)* and the return on equity (*ROE*) for market valuation modelling. The leverage controls for the ambiguous relationship between the capital structure and market evaluation, while ROE is expected to relate positively with the market performance by reduction of risk exposure. We control for corporate governance comprising of Board size. All variables included in the model is explained in Table 1.

3.3. Models

We use OLS regression with company and year controls to test the influence of CFO roles on the Enterprise Risk Management. In addition, we also apply logistic regression as a result of adopting a binary variable for *ERMsopH*, which equals 1 if *ERMsco* is higher than 3 and 0 otherwise. Thus, we use Model 1 in an acceptable form to achieve our objectives.

$$ERM_{it} = \beta_0 + \sum \beta_1 CFOroles_{it} + \beta_2 Controls_{it} + \varepsilon_{it} \quad (1)$$

We further regress the impact of ERM Sophistication on the firm performance, which is proxied by ROA (Accounting-Based Measure) and Tobin Q (Market-Based Measure) while we examine the CFO moderating effect alongside.

$$Performance_{it} = \beta_0 + \beta_2 ERM_{it} + \beta_3 Controls_{it} + \varepsilon_{it} \quad (2)$$

4. Results

4.1. Descriptive statistics

Table 2 reports the descriptive statistics for the exogenous and endogenous variables divided into Panel A - continuous and Panel B - dichotomous variables.

Table 2 reports the descriptive statistics for the proxied CFO variables. The data indicates that 96% of the CFOs possess any accounting professional certification (ACCA, ACA or CIMA) while 61% have audit experience, with 46% possess MBA certificate or equivalent. In addition, 32% of the CFOs have consulting experience with 10% part of the board of directors and 72% are retained their position in subsequent years.

Regarding the adopted control variables, the CFOs are largely male with closely 83% while the average number of board magnitude in our sample is approximately 11 members. The data reports low profitability on average with average ROA equal to 2% and mean ROE equals 10% as some observations have strong negative performance.

The mean Tobin's Q is less than 1, signalling mismatch between the

Table 1
Description of variables.

Variables	Measurement
ERM Sophistication	
RiskReport	Dummy variable equal to one if the firm has a risk management report in its annual report, and 0 otherwise
CROx	Dummy variable equal to 1 if the company has designated a chief risk officer or an ICR officer, and 0 otherwise [CG Report] Example of CRO = 1:
RCommittee	Dummy variable equal to 1 if the company has designated a specific risk committee or an ICR committee, and 0 otherwise [Corporate Governance Report] Example of RiskCommittee = 1
RBoard	Dummy variable equal to 1 if the Corporate Governance body responsible for risk management, i.e., the specific risk committee or the ICR committee or, these two lackings, the IC committee, refers to the BoD at least biannually, and 0 otherwise [CG Report] Example of RCtoBoD = 1
Rfrequency	Dummy variable equal to 1 if the company performs the risk assessment procedure at least biannually, and 0 otherwise [CG Report] Example of RAfrequency = 1
Rlevel	Dummy variable equal to 1 if the company carries out the risk assessment procedure at a level lower than the overall company (e.g., by business unit or function), and 0 otherwise [CG Report] Examples of RAlevel = 1
Rmethod	Dummy variable equal to 1 if the company adopts both qualitative and quantitative methods of risk assessment, and 0 otherwise [CG Report] Example of RAmethod = 1
ERMsco	Sum of the following variables: CRO, RiskCommittee, RCtoBoD, RAfrequency, RAlevel, RAmethod.
ERMsopH	Dummy variable equal to 1 if ERMscore is equal to or higher than 4, and 0 otherwise
CFO characteristics	
Expertise	Variable equal to 1 if the CFO has Recognized Accounting Professional Qualification, 0 otherwise
AuditExp	Variable equal to 1 if the CFO has some experience in an audit company during his/her career, 0 otherwise
Education	Variable equal to 1 if the CFO has an MBA, 0 otherwise
ConsultExp	Variable equal to 1 if the CFO has some experience in a consulting company during his/her career, 0 otherwise
Directorship	Variable equal to 1 if the CFO sits on the Board, 0 otherwise
CFO gender	Variable equal to 1 if the CFO is male, 0 otherwise
Retention	variable equal to 1 if the CFO is the same person in $YEAR_t$ as in $YEAR_{(t-1)}$, 0 otherwise
Control Variables	
ROA	Profit after Taxation divided by Total Asset of the firm
Tobin Q	The book value of total assets minus the book values of equity plus the market value of equity all divided by the book value of total assets.
Leverage	Total Debt/Total Common Equity
Firm size	The natural logarithm total assets of the firm
Board Magnitude	The total number of members on the board

market evaluation and the replacement cost of assets. While the average leverage is 27%, the mean of the log firms' asset is 18.33%.

Panel B of Table 2 presents the frequency distribution of the ERM components. The 78% of CRO exist in our sample indicating large CRO officers similar to U.S. firms (Desender, 2011). In addition, 96% of our sample have a more dedicated presence of Risk committee. Similar to Florio and Leoni (2017), 93.87% of Risk Committee reports to the Board of Directors at minimum biannually. None of the samples performs risk assessment at least biannually while 77.91% of the companies perform a risk assessment to lower level than the overall corporate. All the companies adopt both qualitative and quantitative methods in risk assessment while 87.27% have more than the ERM components combined.

Various aspects of the CFO role tends to be complimentary (Caglio et al., 2018) and could lead to multicollinearity statistical problem. Therefore, we do not categorize CFO roles as an either managerial or fiduciary duty. However, we employ factor analysis to condense six variables relating to CFO roles. Panel A of Table 3 reports the correlation matrix of the CFO roles variables. The correlation coefficients are weak, which indicate that the proxies capture diverse structures of the CFO roles (Adams and Veprauskait, 2013). Panel B further shows the factor analysis of various aspects of CFO roles relative to each other. The factor with or without varimax rotation extracts three factors with eigenvalue exceeding 1. Therefore, we extract the factor grouping to generate categories of CFO roles. We create CFO Power, which characterized by CFO expertise, directorship and retention of position. While the CFO experience contains CFO consulting experience and auditing experience and the CFO knowledge contains CFO education possessing MBA or equivalent.

Table 4 reports the differences in ERM sophistication between CFO on the board and the CFO serving as management team only. The two categories contain firm-year observations with different ERM sophistication. Results in Table 4 present that the ERM sophistication (*ERMsopH*) where the CFO seats on Board are significantly higher than the ERM sophistication of CFOs not on the board. The average ERM sophistication of CFO on board is 4.938, while 4.412 for CFO not on the Board. This implies that the CFO position is negatively related to ERM sophistication.

4.2. Correlations

Table 5 presents the correlation coefficient of our desired variables. From the table, it appears that two ERM measures are highly correlated with each other. To avoid any multicollinearity statistical problem, we use each of them in dissimilar regression specifications, which enhance the robustness of our study. The proxy for CFO roles (*CFO Power; CFO Experience and CFO Knowledge*) is positively correlated with ERM implementation (*ERMsco and ERMsopH)*, which align with our expectations. Similarly, the table presents a low correlation among the variables. Hence, there is no suggestion for multicollinearity statistical problem in the models.

4.3. Main findings

Column 1 of Table 6 reports the effect of various CFO roles on the ERM sophistication (*ERMsco)*. The results reveal a positive relationship between the CFO roles on ERM implementation except for the audit experience (*AuditExp)*, which present a negative influence on ERM while control variables exempted. However, only the consulting experience and the director that are positive significant on the ERM implementation. This implies that the CFO on the board and their consulting contribute positively on the ERM sophistication (see Table 7).

H_1, H_2, H_3 presume that CFO roles are positively associated with ERM sophistication. Table 6 reveals the statistical results. To test whether CFO roles contribute positively to the ERM implementation, while ERM implementation (*ERMsco*) is the dependent variable. From column 2 of Table 6, the coefficient of CFO power is positively associated with the ERM sophistication supporting our H_1. However, the relationship remains insignificant. Column 3 reports the influence of CFO experience on the ERM implementation supporting the presumed H_2. These results signal the passive contribution of CFO roles on the ERM implementation. This result commensurate with the idea that CFOs are concerned with the traditional ways to mitigate risks and less involved with the ERM implementations in the Nigerian context.

Furthermore, column 5 include the influence of CRO position on the ERM sophistication and the results report a positively significant association with ERM implementation (at p-value <0.001). Such results align with prior studies (Ahmad et al., 2014; Beasley et al., 2005; Cohen, Krishnamoorthy and Wright, 2014b). This result suggests that the full responsibility of ERM implementation is solely on the Chief Risk Officer while the input of the CFO is minimal. Therefore, we argue that the involvement of CFO in the implementation of EFM could be more effective and less costing.

Regarding the control variables, the ERM sophistication is positively associated with the board magnitude (the number of board members), with the Tobin Q (the market-based performance measurement), with the leverage and with the firm size, which positively significant (at p-

Table 2
Descriptive statistics.

Panel A: Statistical Summary

Variable	N	Mean	Median	SD	25%	75%
CFO-role						
Expertise	164	0.96	1.00	0.20	1.00	1.00
AuditExp	164	0.61	1.00	0.49	0.00	1.00
Education	164	0.46	0.00	0.50	0.00	1.00
Consult	164	0.32	0.00	0.47	0.00	1.00
Directorship	164	0.10	0.00	0.30	0.00	0.00
Retention	164	0.72	1.00	0.38	0.00	1.00
Control Variables						
CFO gender	164	0.83	1.00	0.38	1.00	1.00
Board Magnitude	164	11.23	11.00	3.68	8.00	14.00
TobinQ	164	0.93	0.92	0.25	0.84	1.03
ROA	164	0.02	0.02	0.063	0.01	0.03
ROE	164	0.10	0.08	0.20	0.03	0.16
Leverage	164	0.27	0.22	0.37	0.22	0.40
Size	164	18.33	17.30	2.44	16.28	20.84

Panel B: Frequency distribution of the ERM components

Components	Dichotomous	Frequency 2013–2017	% 2013–2017
CROx	0	35	21.21
	1	130	78.79
RCommittee	0	5	3.07
	1	158	96.93
RBoard	0	10	6.13
	1	153	93.87
Rfrequency	0	163	100
Rlevel	0	36	22.09
	1	127	77.91
Rmethod	1	164	100
ERMsopH	0	21	12.73
	1	124	87.27

Table 3
CFO roles: Principal component factoring.

Panel A. Correlation	1	2	3	4	5	6
1. Expert	1					
2. AuditExp	0.110	1				
3. Education	−0.0808	−0.125	1			
4. ConsultExp	−0.0768	0.112	0.0380	1		
5. Directorship	−0.263***	−0.243**	0.0251	0.0402	1	
6. Retention	−0.122	−0.124	−0.0744	−0.119	0.159*	1

Panel B. Factor Analysis

	Factor pattern			Factor pattern with varimax rotation		
	Factor 1 CFO Power	Factor 2 Experience	Factor 3 Knowledge	Factor 1 CFO Power	Factor 2 Experience	Factor 3 Knowledge
Expert	−0.6030	−0.3220	−0.2757	**−0.6838**	−0.2666	−0.0678
Directorship	0.7166	0.1080	0.2021	**0.7506**	0.4600	0.0472
Retention	0.4837	−0.4830	0.2768	**0.5021**	0.0232	−0.3650
Consult	−0.0657	0.7533	0.3931	0.1232	**0.8425**	0.0362
AuditExp	−0.6215	0.1404	0.4341	−0.4434	**0.4600**	−0.4316
Education	0.2102	0.4700	−0.7105	0.0210	0.0316	**0.8766**
Eigenvalue	1.545891	1.15677	1.04128	1.495	1.152	1.096

*** p<0.01, ** p<0.05, * p<0.1.

value < 0.01). The positively significant of firms' size implies that larger firms tend to implement ERM aggressively with the assumption that larger firms encounter more risks compared to smaller firms.

Table 4
Differences in ERM sophistication between the two subsamples.

	CFO not on Board	CFO seats on Board	Test of Difference	
			Dif.	t
ERMsco	0.864	1	−0.136	−1.578
ERMsopH	4.412	4.938	−0.525**	−2.274

*** p<0.01, ** p<0.05, * p<0.1.

5. Robustness analysis

5.1. CFO roles and operational ERM components

In the main analysis, we condense six components developed by Florio and Leoni (2017) to capture the holistic perspective of risk management. Now we consider two distinct components namely designated responsibility to Risk committee (*RCommittee*) and involvement of lower

Table 5
Correlation matrix.

	1	2	3	4	5	6	7	8	9	10	11
1. ERMsco	1										
2. ERMsopH	0.812***	1									
3. Power	0.160*	0.155	1								
4. Experience	0.147	0.0501	0.0116	1							
5. Knowledge	0.0805	0.135	0.00325	−0.0127	1						
6. TobinQ	0.201*	0.174*	0.0961	0.275***	0.0274	1					
7. ROA	−0.224**	−0.115	−0.0311	−0.238**	−0.104	−0.451***	1				
8. Leverage	0.214**	0.172*	0.0411	0.175*	0.268***	0.352***	−0.564***	1			
9. Bsize	0.309***	0.201*	0.357***	0.0679	0.157*	0.0402	0.00804	0.133	1		
10. Size	0.356***	0.290***	0.281***	0.233**	0.215**	0.121	0.0390	0.221**	0.617***	1	
11. CFO gender	−0.0391	−0.113	−0.0926	0.144	0.221**	−0.0234	−0.0631	0.0974	−0.0274	0.0410	1

*p < 0.05, **p < 0.01, ***p < 0.001.

Table 6
Multivariate Analysis of CFO Roles on ERM score.

OLS	1	2	3	4	5
CFO Roles					
Expertise	0.137				
	(0.343)				
AuditExp	−0.106				
	(0.134)				
Educate	0.0892				
	(0.126)				
Consult	0.386***				
	(0.136)				
Director	0.430*				
	(0.222)				
Retention	0.0166				
	(0.142)				
CFO Power		0.0128			0.0604
		(0.0633)			(0.0448)
CFO			0.0172		0.0880*
Experience			(0.0637)		(0.0455)
CFO				−0.00837	0.0517
Knowledge				(0.0631)	(0.0449)
CRO					1.478***
					(0.118)
Control Variables					
Board		0.0302	0.0316	0.0313	0.0148
Magnitude		(0.0211)	(0.0206)	(0.0206)	(0.0150)
CFO gender		−0.118	−0.127	−0.117	−0.156
		(0.156)	(0.157)	(0.158)	(0.113)
TobinQ		0.210	0.201	0.211	0.0656
		(0.271)	(0.274)	(0.271)	(0.194)
ROA		−2.691**	−2.648**	−2.699**	0.543
		(1.229)	(1.243)	(1.228)	(0.911)
Leverage		0.00207	0.00218	0.00516	0.153
		(0.201)	(0.201)	(0.205)	(0.145)
Size		0.0894***	0.0879***	0.0904***	−0.00910
		(0.0318)	(0.0325)	(0.0318)	(0.0244)
Constant		2.466***	2.491***	2.431***	3.342***
		(0.524)	(0.541)	(0.521)	(0.404)
Observations		160	160	160	160
R-squared		0.204	0.204	0.204	0.614
rmse		0.738	0.738	0.738	0.519
F-test		5.565	5.571	5.561	23.70
Prob > F		1.01e−05	9.95e−06	1.02e−05	0

Standard errors in parentheses ***p < 0.01, **p < 0.05, *p < 0.1.

level in risk management endeavours. We exclude other ERM components because of the presence of multicollinearity statistical problem. Interestingly, we find that CFO roles contribute passively to the firms' ERM implementation. This is not surprising as organizations tend to delegate the activities of the ERM to solely CRO, which undermine the power, knowledge and experience of CFO relating to the ERM endeavours.

Table 7
Additional analysis.

	Risk Committee		Risk Level		
Logit	1	2	1	2	3
CFO Power	0.218		0.447		
	(0.982)		(0.307)		
CFO Experience		2.403		0.210	
		(1.987)		(0.245)	
CFO Knowledge					−0.114
					(0.227)
Control Variables					
TobinQ	−4.370**	−7.365*	2.573**	2.522**	2.526**
	(2.225)	(3.763)	(1.121)	(1.119)	(1.121)
ROA	−32.31**	−40.19**	5.650	6.334	5.599
	(13.35)	(17.35)	(4.025)	(4.131)	(4.011)
Leverage	−0.328	0.558	0.725	0.769	0.838
	(2.711)	(3.204)	(0.898)	(0.951)	(0.946)
Size	0.228	0.219	0.158	0.181*	0.206**
	(0.313)	(0.335)	(0.104)	(0.106)	(0.105)
Constant	5.428	9.815	−4.029**	−4.444**	−4.944**
	(6.071)	(7.458)	(2.005)	(2.031)	(1.974)
Observations	161	161	161	161	161
Pseudo R-squared	0.270	0.332	0.129	0.118	0.115
chi-squared	10.11	12.43	21.70	19.88	19.39
Prob > chi2	0.0721	0.0294	0.000596	0.00131	0.00163

Standard errors in parentheses ***p < 0.01, **p < 0.05, *p < 0.1.

5.2. CFO roles and the alternative ERM sophistication measure

To validate results obtained in the main regression models, we further test our formulated hypotheses altering the dependent variable. We change the ERM sophistication (*ERMsco*) with *ERMsopH*, which adopts binary variables (where *ERMsopH* equals to 1 if the *ERMsco* greater or equal to 4 and 0 otherwise*)*. We then use the ordinal logistic regression model to address the formulated hypotheses. These results confirm the robustness of the main test as the desired variables retain their results (see Table 8).

5.3. Performance and risk appetite

Interestingly, empirical studies have extensively examined the association between ERM implementation and the firm performance (Florio and Leoni, 2017; Mohammed and Knapkova, 2016; Nickmanesh et al., 2013). The underlying assumption holds that firms with strong profitability could invest intensive resources in ERM activities, which suggests a positive relationship between ERM implementation and firm performance. Indeed, ERM implementation tends to minimize the companies' risk exposure, which could enhance firm performance. Prior studies (Baxter et al., 2013; Gordon et al., 2009; Pagach &Warr, 2010) claim that risk reduction could prevent losses; bankruptcy and reputation risk. However, Ellul & Yerramilli (2013) opine that extensive ERM could

Table 8
Multivariate analysis of ERM implementation (1 = ERMsco ≥4 or 0 = Otherwise) and CFO roles.

Logit Regression	1	2	3	4	5
CFO Roles					
AuditExp	−0.159				
	(0.584)				
Educate	1.222**				
	(0.612)				
Consult	1.005				
	(0.674)				
Retention	0.579				
	(0.546)				
CFO Power		0.492			1.324
		(0.490)			(0.965)
CFO Experience			−0.453		0.453
			(0.412)		(0.738)
CFO Knowledge				0.256	1.079
				(0.348)	(0.745)
CRO					6.581***
					(1.609)
Bsize		0.137	0.181	0.123	−0.0152
		(0.125)	(0.134)	(0.129)	(0.233)
sex		−1.641	−1.676	−1.645	−2.847*
		(1.132)	(1.157)	(1.111)	(1.475)
TobinQ		1.645	2.086	1.996	4.337
		(1.373)	(1.419)	(1.451)	(3.018)
ROA		−3.500	−4.359	−3.395	15.44
		(5.663)	(5.736)	(6.109)	(10.56)
Leverage		0.556	0.466	0.281	0.350
		(1.652)	(1.504)	(1.664)	(2.113)
Size		0.384*	0.471**	0.390**	0.606
		(0.201)	(0.202)	(0.198)	(0.620)
Constant	0.985	−5.800	−8.182*	−6.111	−11.96
	(0.683)	(3.978)	(4.214)	(3.863)	(11.71)
Observations	159	159	159	159	159
Pseudo R-squared	0.0749	0.225	0.225	0.219	0.691
chi-squared	8.064	25.23	25.29	24.62	77.63
Prob > chi2	0.0893	0.000690	0.000675	0.000886	0

Standard errors in parentheses ***p < 0.01, **p < 0.05, *p < 0.1.

affect market valuation negatively. Moreover, there is yet no consensus on whether ERM implementation increases firm performance by taking more risk or less (Nocco and Stulz, 2006).

In this perspective, we further examine the influence of sophisticated ERM on the performance and risk appetite of firms. To achieve this objective, we estimate OLS regression where the firm performance is measured by market-based measure (TobinQ) and accounting based measure (ROA & ROE) and its risk appetite is proxied by leverage and sophisticated ERM (dummy variable) as an explanatory variable (see results in Table 9). Our empirical evidence reports that the sophisticated ERM only promote the market evaluation while the accounting performance is undermined. The result then contravenes the expectation that effective ERM enhances accounting performance by mitigating risk exposure. While the ERMsopH is significantly positive with leverage, which reveals that ERM implementation does not necessarily reduce the firm risk. This indicates that the ERM implementation remains ineffective to mitigate risks contrary to prior studies ((Baxter et al., 2013; Gordon et al., 2009; Pagach &Warr, 2010).

6. Conclusions

Studies investigating the contribution of CFO in ERM implementation remain scanty. Therefore, this paper examines the extent of CFO roles in the ERM implementation in a sample of Nigerian financial firms within the timeframe of 2013–2017 following the different Central Bank of Nigeria directives to minimize risks in financial institutions. This study is patterned to reveal the contribution of CFO in the implementation of risk

Table 9
ERM and firm performance.

OLS	Tobin Q	ROE	ROA	Leverage
ERMSco	0.0359	−0.0337*	−0.0128**	0.0674*
	(0.0247)	(0.0198)	(0.00535)	(0.0373)
CFO Power	0.0242	0.000781	−0.00335	−0.00143
	(0.0194)	(0.0157)	(0.00424)	(0.0299)
CFO Experience	0.0497***	0.00648	−0.0113***	0.0496*
	(0.0189)	(0.0153)	(0.00413)	(0.0288)
CFO Knowledge	−0.0136	−0.0113	8.38e−05	0.0890***
	(0.0191)	(0.0155)	(0.00418)	(0.0286)
Leverage	0.209***	0.196***	−0.0938***	
	(0.0558)	(0.0423)	(0.0114)	
ROE	−0.00274			
	(0.0999)			
Board Magnitude	−0.00521	−0.00759	−1.61e−05	−0.00181
	(0.00659)	(0.00530)	(0.00143)	(0.0101)
Size	−0.000691	0.0148*	0.00723***	0.0149
	(0.0101)	(0.00810)	(0.00219)	(0.0154)
Constant	0.779***	0.00872	−0.0347	−0.285
	(0.167)	(0.135)	(0.0365)	(0.256)
Observations	161	161	161	161
R-squared	0.192	0.162	0.401	0.140
rmse	0.228	0.184	0.0498	0.351
F-test	4.510	4.227	14.63	4.178
Prob > F	6.16e−05	0.000273	0	0.000639

Standard errors in parentheses ***p < 0.01, **p < 0.05, *p < 0.1.

assessment mechanisms, which is gaining increased attention of policy makers, academicians and regulators. This study is basically motivated by the International Federation of Accountants report titled "*Enabling the Accountant's Role in Effective Enterprise Risk Management*", which identifies the potential contribution of CFO to Enterprise Risk Management. Moreover, this study shifts from developed economies to a developing country, which is plagued with weak institutions (Adegbite, 2015; Ojeka et al., 2017b). In the Nigerian context, CFOs are always part of the management teams but hardly gain any position on the Board.

Following prior study (Florio and Leoni, 2017) on ERM sophistication, we simultaneously adopt six distinct ERM components, which distinguish the firms with more sophisticated ERM and less sophisticated ERM. To achieve our main objective, we then condense the CFO roles using principal factoring analysis, which are reduced to three main factors namely CFO power; CFO experience and CFO knowledge. Our analysis validates that CFO roles seem passive relative to the sophisticated ERM. We also find that companies with CFO on the board tend to have sophisticated ERM while companies without CFOs on the board have less or no sophisticated ERM. This reveals the extent of the CFO roles when ERM implementation is solely undertaken by CRO. Moreover, the study further examines the influence of sophisticated ERM on firm performance while moderating the effect of CFO. We find that ERM focuses basically on market evaluation while minimizing accounting-based performance significantly. In addition, ERM adopted by firms progressively increase leverage. This result shows that the extent of sophisticated ERM is less effective to mitigate the level of risk, while the ERMsopH is significantly positive with leverage. These results pose that the CFO involvement in ERM implementation remains minimal while the CRO is solely responsible for ERM implementation, which could undermine cost-benefit effectiveness.

Our findings validate that CRO tends to undertake risk management activities primarily for CFO. In addition, the integration of Information Technology into internal control, data management and other compliance activities pose a potential conflict between CRO and CFO. We argue that CFO roles are beyond traditional compliance and risk mitigation endeavours as they have the characteristics to actively lead organizational ERM initiatives. Therefore, CFOs should be allowed to contribute strongly on some specific aspects of ERM initiatives namely identification and analysis of key risk indicators, the financial implication of risks and integration of ERM into traditional finance activities.

Declarations

Author contribution statement

A. Adegboye, K. Adegboye: Performed the experiments; Analyzed and interpreted the data.

Stephen Ojeka: Conceived and designed the experiments.

Oluwaseyi Alabi: Wrote the paper.

Mosinmileoluwa Afolabi: Performed the experiments.

Francis Iyoha: Contributed reagents, materials, analysis tools or data.

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